

## Flood Map Modernization State Business Plan

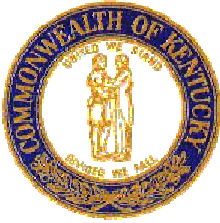
Commonwealth of Kentucky

Kentucky Division of Water

March 26, 2004

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## Flood Map Modernization State Business Plan Commonwealth of Kentucky



### I. Executive Summary

The Kentucky Division of Water (KDOW) is an agency within the newly formed Environmental and Public Protection Cabinet (EPPC). KDOW is responsible for floodplain management activities throughout the Commonwealth, and has prepared this Business Plan in support of the Federal Emergency Management Agency (FEMA) Map Modernization program. This plan addresses the state's vision for successful implementation of the Map Modernization program and the role of KDOW and other partners.

KDOW was the first Cooperating Technical Partner (CTP) in Kentucky and has coordinated with FEMA on numerous mapping projects while serving in this role since 1999. Through Map Modernization, KDOW will expand this CTP role to include additional responsibilities.



KDOW is proposing to utilize Community Assistance Program and Map Modernization (CAP MAP) Phase II funding to gradually build a floodplain management program that would oversee statewide services of data collection, map digitization, and floodplain regulation. KDOW will focus on building partnerships throughout the state to help foster and develop the tools and capabilities necessary. Ultimately, KDOW will grow the expertise and personnel necessary to administer and oversee mapping projects, and conduct a limited number of studies in-house.

To meet FEMA metrics goals, KDOW's production schedule focuses on addressing high population counties early in the program, and processing the remaining counties according to their location within the major watersheds. This approach exceeds FEMA's metrics and provides a cost effective, logical basis for production. Additionally, KDOW will utilize new approximate studies throughout the state to ensure adequate resources for providing all 120 counties with updated flood hazard data.



Kentucky Natural Resources and  
Environmental Protection Cabinet  
Division of Water

By focusing first on highly populated counties, then on major watersheds and utilizing resource-conserving approximate studies, KDOW has developed a mapping production schedule to exceed FEMA goals, as well as positioning the state with the knowledge and resources for future maintenance and administration of the floodplain management program.

KDOW has determined that through the effective use of partnerships and by leveraging the success of CTPs, the state will be able to focus on conducting mapping projects to meet their metrics goals and increasing their capacity for program management.

## II. Vision

### Current Efforts

The Commonwealth of Kentucky's floodplain management program is administered through the Water Resources Branch of the Division of Water. This branch is responsible for issuing construction permits in the floodplain, helping to prevent losses from flooding, and coordination of the National Flood Insurance Program (NFIP) in Kentucky.

#### KRS 151.260(3)

*Upon receipt of all plans and specifications, the Cabinet shall notify the applicant in writing within 20 days either that the permit will be issued or denied, or that certain modifications to the plans or specifications must be made before a permit will be issued.*

### **KDOW's Charter Responsibilities**

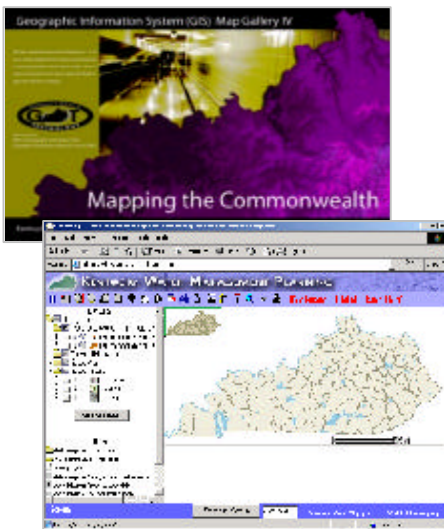
The KDOW's role as the official state agency for flood control and water resource development is prescribed in the Kentucky Revised Statute (KRS). There are a myriad of responsibilities, including the Floodplain Management Section's administration and oversight of the state's floodplain regulation, mapping, and insurance programs. The KRS authorizations and charters also mandate the responsibility for:

- Establishment of a statewide flood control and water resource development program.
- Jurisdiction over all streams with the authority to establish and enforce floodways for flood control and water resource development purposes.
- Gathering, assessing, and maintaining water resource studies from federal or state agencies.
- Public floodplain and flood hazard information program.

Additionally, as the state coordinating agency for the NFIP, the Division assists local communities with their floodplain management programs and provides technical assistance to lending institutions, insurance agencies, engineers, consulting firms, and the general public.

To fulfill these responsibilities, KDOW has developed a floodplain management assistance program that includes a floodplain construction permitting process. The Floodplain Management Section is responsible for the review, approval, and/or denial of proposed construction, improvement or reconstruction of any structure, or deposition of material or other construction across or along any stream in Kentucky. Proposed activities include bridge/dam construction, BFE determinations for residential and commercial buildings, placement of fill, stream relocations, and water/wastewater treatment plants.

Upon receipt of an application for a floodplain permit, KDOW has 20 days to either approve or deny such requests. During this time, staff will normally review existing flood data for the site (Flood Insurance Rate Maps, U.S. Army Corps of Engineers flood studies, or previous permit data) or conduct an in-house flood study of the area. The in-house studies use the Corps of Engineers HEC-2 and HEC-RAS computer program(s) to analyze the effects of the proposed construction on existing flood conditions. This analysis allows KDOW to determine if the project meets regulatory requirements and whether to approve or deny the application.



*The Kentucky Water Resource Information System (<http://wris.ky.gov/wris>) and the Kentucky Office of Geographic Information (<http://ogis.state.ky.us/>) make statewide digital data available to the Commonwealth.*

## **Existing Statewide GIS Basemap Layers**

### KYOGI

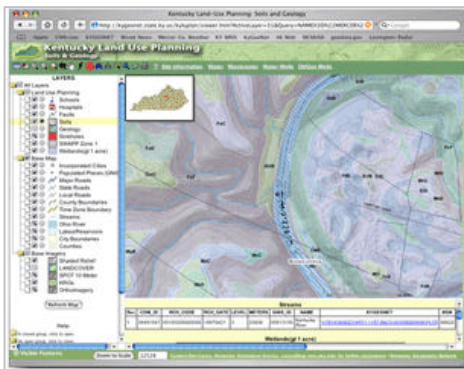
- *Transportation Local and State Roads (GPS Centerlines)*
- *USGS DOQQ (1993 - 1999 fly dates)*
- *Landuse Layer*
- *Municipal Boundaries*
- *Digital Elevation Models*
- *Hydrography*

### KYGEONET

- *Municipal Boundaries - updated frequently*
- *Digital Topo Quads*
- *Transportation*
- *Hydrography*
- *NGS Benchmarks*
- *USGS DOQQ MrSID Format*

### Kentucky Natural Resources Environmental Protection Cabinet

- *Digital Elevation Models*
- *Hydrography*
- *Contours*



*The Kentucky Geo-NET (<http://kygeonet.ky.gov/>) is the Commonwealth's clearinghouse for digital mapping information.*

KDOW is also specifically charged with conducting floodplain management outreach aimed at mitigating flood hazard risks throughout the state. These programs are to be used by local units of government to aid in their own development of floodplain management and flood hazard mitigation programs. These programs are made easily available to the public and include training workshops, booklets, and model ordinances.

### **NFIP Activities**

As the Commonwealth's NFIP Coordinator, KDOW is responsible for assisting in the oversight and management of the state's floodplains. As a service to local communities, KDOW provides site-specific BFE determinations, as well as permitting assistance at the local level. Additionally, the state is tasked with tracking cumulative loss and substantial damage, but has limited resources to administer the program effectively.

### **Statewide Modeling Activities**

In support of their role as the Commonwealth's permitting authority, KDOW performs full hydrologic and hydraulic (H&H) analysis on a site-by-site basis. These analyses are conducted as a result of the floodplain permitting process through the verification of submitted data and existing maps. Performed by in-house engineering staff, these services are provided to assist local communities in support of KDOW's assessment of flood hazards and potential development within the floodplain. It is estimated that KDOW engineers conduct 5 to 10 site-specific analyses per month.

In addition to KDOW's providing H&H modeling services to local communities, staff at the Kentucky Transportation Cabinet (KYTC) conducts additional flood hazard analyses in support of KYTC design and maintenance of state roads. During the construction of new state bridges, both upstream and downstream analyses are conducted.

### **Statewide Floodplain Data Management**

The Commonwealth of Kentucky makes an extensive network of digital mapping and data available to communities throughout the state. Commonwealth websites such as the Water Resource Information System (WRIS) and the Kentucky Office of Geographic Information (KYOGI) are aimed at making digital statewide data sharing easy and accessible for partners throughout the Commonwealth.

WRIS and KYOGI are also members of a larger Commonwealth-wide GIS information site, known as the Kentucky Geo-NET (KYGEONET) (<http://kygeonet.ky.gov/>). The KYGEONET is based on partnerships and coordination between multiple state agencies, including the EPPC, WRIS, Kentucky Geological Survey (KGS), KYOGI, and the Governors Office for Technology (GOT).

The KYGEONET provides a wealth of digital data and information to communities throughout the state to aid in inventory, planning, and fulfilling their overall geospatial needs. The site provides information from agencies such as the Department of Fish and Wildlife, KGS, Kentucky Revenue Cabinet, KYTC, Louisville-Jefferson County Information Consortium (LOJIC), National Geodetic Survey, KEPPC, Office of Geographic Information, Public Service Commission, and the Water Resource Information System.

The Commonwealth's flood hazard basemap information is maintained and updated by participating agencies and made available through the WRIS, KYOGI, and KYGEONET websites. The extensive digital statewide basemap data will allow KDOW to quickly and

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effectively develop and transition the state to Digital Flood Insurance Rate Map (DFIRM) products and can be easily utilized to integrate into the vision of a statewide Hazard Information Portal (HIP).

KEPPC has also implemented a digital permitting and document management system, called TEMPO that aids in the overall permitting process. TEMPO provides a standardized architecture for software and data structures that can accommodate data from multiple regulatory programs—such as air pollution control, water pollution control, and hazardous waste management—and that can provide integrated (i.e., cross-program) access to data. TEMPO provides an approach that promotes efficient, well-integrated data management within each environmental program area and also facilitates cross-program data viewing and multi-program retrievals.

## ***DFIRM Basemap***

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*Kentucky has all the necessary digital basemap layers available to directly support DFIRM development for the entire state.*

Lastly, KDOW maintains a floodplain management website (<http://www.water.ky.gov/floods/plainmanage>) that serves as a resource to local floodplain managers and includes informational links, downloads and floodplain management staff contacts.

## **Future Efforts**

KDOW is proposing to utilize Map Modernization funding to gradually build a floodplain management program that would oversee statewide services of data collection, map digitization, and floodplain regulation. KDOW will focus on building partnerships throughout the state to help foster and develop the tools and capabilities necessary. Ultimately, KDOW will grow the expertise and personnel necessary to administer and oversee mapping projects, and conduct a limited number of studies in-house.

Preliminary focus of KDOW's program is on initiating projects to fulfill FEMA's FY05 metrics for map updates and working with the state's larger CTP communities (Louisville, Northern Kentucky and Lexington) to capitalize on their existing local floodplain tools, resources, and knowledge to develop capabilities that can be taken to other communities statewide. During the first year, KDOW would serve in a contract administrator or oversight capacity for the initial start-up of the mapping activities, allowing KDOW to build the capacity and capability for increasing their program management activities.

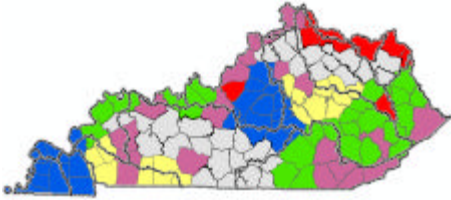
In subsequent years, KDOW will capitalize upon the administrative flood management tools developed by the larger communities, modify them for use by communities throughout the state, and make them available through a state all hazard information portal to aid smaller communities in their initial development and/or expansion of their floodplain management programs.

This approach capitalizes upon the investments and resources of the CTP communities to further the state's management program.



## III. Strategies

KDOW's program balances the fulfillment of FEMA metrics with the development of the state's capabilities to support a long-term floodplain management program.



*Kentucky's DFIRM Production strategy includes a logical watershed-based approach that meets FEMA's metrics.*

### Map Modernization Projects

KDOW has developed a strategy for funding and completing the remapping of the state's floodplains in accordance with FEMA's metrics goals. The initial focus is placed on high priority areas based on the population, amount of risk, and other political considerations. KDOW also considered watershed boundaries, NFIP participation and potential local leverage to help prioritize the remainder of the counties. With 120 counties to consider, KDOW has developed an aggressive schedule to best meet FEMA's metrics through a logical, watershed-based approach.

Year	Percent of Kentucky Population with Preliminary DFIRM FEMA Target	Percent of Kentucky Population with Preliminary DFIRM KDOW Estimated
2004	20%	8%
2005	50%	57%
2006	65%	68%
2007	75%	79%
2008	85%	88%
2009	100%	100%

For further details on the projects and counties to be completed, see Section IV – Project Management Plan.

### Getting the Work Done

*It is anticipated that the state will procure the services of a FEMA Map Modernization contractor to support the allocation of FY05 funding.*

### Program Management

KDOW has developed a strategy to build the in-house capacity to run and oversee their floodplain management program. The Division has identified the following components of their program management and administration activities:

- **Cooperating Technical Partnership**  
KDOW has both the desire and the capabilities to manage the Map Modernization program for Kentucky. Through a CTP agreement signed in 1999, KDOW agreed to collaborate with FEMA on flood hazard identification activities and to fully integrate the contributions of the state and FEMA into those efforts. This CTP agreement will serve as the foundation of the state's Map Modernization Business Plan.
- **Contract Procurement and Administration**  
As KDOW builds the capacity for managing projects, there will also be an increasing role in the oversight and administration of consultants. Contract procurement and administration activities will include the selection of study contractors, determining the scope of the projects, monitoring budgets and schedules, and review of final projects. It is anticipated that the state will procure the services of a FEMA Map Modernization contractor to support the allocation of FY05 funding. KDOW will also assist CTP communities in the review and selection of qualified contractors to perform local CTP mapping

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activities. Since KDOW will be responsible for ensuring the quality of the studies, selection and monitoring of contractor activities will be essential to ensure performance goals are met.

## **44 CFR Part 66 - Coordination**

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*One of KDOW's essential roles is coordination with local authorities to determine a county's needs, resources, and floodplain mapping desires. All coordination will be performed in accordance with 44 Code of Federal Regulations, Part 66 Consultation with Local Officials.*

### ➤ **Project Management**

KDOW anticipates that the first year (FY04) of the Map Modernization program will be used by the state to build capabilities and extend partnerships and that the majority of mapping activities will be conducted externally. In future years, KDOW will increase their role in scoping and managing the projects, overseeing contractual work, and reviewing products.

### ➤ **Information Sharing and Distribution**

As the official state agency for coordinating the NFIP program, KDOW is charged with providing assistance and guidance to communities and counties throughout the state. KDOW's goal is to reduce the state's flood hazard risk and ensure that counties meet minimum NFIP requirements. To aid in their outreach and distribution of floodplain products, KDOW will implement a statewide all hazard information portal, based on the existing state hazard data management system, the anticipated national Mapping Information Portal (MIP), and an advanced portal that will be developed, implemented and tested by Louisville and Jefferson County Metropolitan Sewer District (MSD).

### ➤ **Project Scoping and Coordination**

One of KDOW's essential roles is coordination with local authorities to determine a county's needs, resources, and floodplain mapping desires. This ongoing data collection process will assist the state in refining their Map Modernization planning, budgeting, and determining the amount of available leverage. All coordination will be performed in accordance with 44 Code of Federal Regulations, Part 66 Consultation with Local Officials.

### ➤ **Limited Project Studies**

As part of their Program Management activities, KDOW may elect to conduct a limited number of studies utilizing in-house personnel. Conducting limited projects will help KDOW maintain familiarity with the project process, skills, and techniques.

### ➤ **QA/QC Review**

As the oversight agency responsible for modernization of Kentucky's floodplain maps, KDOW will increasingly develop the capacity to conduct QA/QC. Through development of qualified (CTP) partners and selection of qualified contractors, the overall amount of QA/QC that will be required by KDOW staff should be limited. In keeping with FEMA's vision for devolving program initiatives to the state and local level and developing an effective QA process, the QA/QC role for FEMA will include random spot checks only. KDOW plans to ease into this QA/QC role during the first few years of the program, and assume complete QA/QC functions by Year 5 of the project (2009).

### ➤ **Information Management and Maintenance**

Proper maintenance and updates of the digital information produced by Map Modernization is essential for maintaining the usefulness of the maps and their value in hazard mitigation. KDOW will be responsible in out years for ensuring the update and revision of Kentucky's floodplains by collecting and integrating studies and Letters of Map Changes (LOMCs), then making the information available on the state's all hazard information portal.

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## ➤ Business Plan Modifications

As the lead state agency in the Map Modernization and floodplain administration programs, KDOW will be responsible for the annual review and updating of the Commonwealth's Business Plan. This annual update will incorporate lessons learned, refine budgetary and leverage estimates, and adjust mapping priorities as necessary.

### Kentucky Hazard Information Portal

*KDOW's portal will provide information for community leaders, federal regulators (FEMA), realtors, developers, engineers, and state residents. Community leaders will have access to additional information and materials to enhance their local permitting programs and reach out to floodprone residents.*

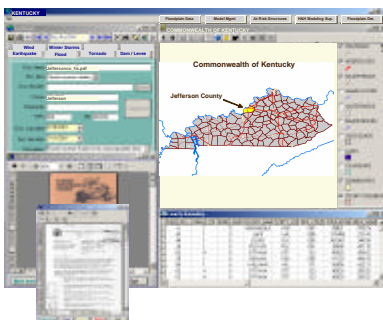
### Web Portals

The core of the state's long-term program includes the development of a statewide All Hazard Information Portal that builds upon the state's existing hazard data management system. KDOW will expand the scope, functionality and accuracy by modernizing the flood hazard data, maps, and assessment tools. The proposed state portal would interface with the anticipated National Service Provider's (NSP) Mapping Information Portal (MIP) and the Hazard Information Portal (HIP) that will be developed by MSD.

The state portal will include automated tools for statewide model management as well as enabling local communities to update and track their high risk/repetitive loss properties in the statewide Disaster Response Database. Additionally, the portal would provide outreach and guidance to local officials, residents, realtors, engineers, developers, and federal regulators on the state's floodplain management. The portal will serve as Kentucky's ultimate floodplain information clearinghouse, making DFIRMs, flood profiles, BFEs, H&H models, and ultimately floodplain determination letters available online. (Refer to Appendix.)

KDOW has determined that through the effective use of partnerships and by leveraging the success of CTPs, the state will be able to focus on conducting mapping projects to meet their metrics goals and increasing their capacity for program management.

KDOW has coordinated with the MSD on the development of the portal capabilities. As a model CTP community, MSD has developed a Business Plan that builds upon their extensive local resources, expertise, and capabilities in floodplain management for initial development of a local portal. MSD has acknowledged that their local portal will be made available to the state for modification and expansion to serve as a statewide All Hazard Information Portal.



*Kentucky's portal would interface with the Hazard Information Portal (HIP) that will be developed by MSD.*



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## Justification

The KDOW Business Plan outlines a logical and effective way for the state, and therefore FEMA, to maximize the amount of mapping projects that can be completed, building the state's capabilities to support a future long-term program, and capitalizing upon leverage already present in Kentucky.

### **Meeting Map Modernization Objectives**

KDOW's Map Modernization Business Plan was developed on the foundation of meeting FEMA's metrics while fulfilling the Map Modernization objectives of establishing:

- Premier data collection and delivery system
- Effective program management
- Beneficial partnerships
- Informed user community

Kentucky's HIP will serve as a pioneering statewide data management and delivery system to aid communities in the inventory, assessment, and mitigation of all flood hazards. It is envisioned that with time, this portal could be expanded to support all hazard data. Through Map Modernization, KDOW will be able to build upon the state's extensive existing basemapping information to ultimately provide localities with their digital floodplain information (DFIRM). The portal will provide a two-way interface to promote information exchange and dissemination, as well as streamlining the Commonwealth's floodplain management activities.

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The modernization and digitization of Kentucky's floodplain maps, establishing an online H&H model and data management system, and the posting of flood hazard information online will reduce the demands of Floodplain Management Staff and enable more effective public outreach and program management. Additionally, Map Modernization and the implementation of the HIP will enable the state to better track and monitor substantial damage, as well as reduce review time for the floodplain permitting program. Automation tools will also decrease staff time spent on BFE and floodplain determinations, while enhancing the state's floodway analysis capabilities. Once implemented, these tools will also aid local communities in fulfilling their floodplain management needs and administering local permitting programs. The online availability of floodplain tools and guidance will ultimately decrease the number of support requests to KDOW.

The foundation of KDOW's plan is a partnership building approach that enables the state to move forward with studies, while allowing CTPs to develop, implement, and pilot floodplain management tools necessary to support the statewide conversion to digital mapping. KDOW and MSD have already coordinated on the development and sharing of Model Management, Disaster Response Database, and Web-Portal technologies, with the understanding that these tools will be made available to communities throughout the state by KDOW's statewide HIP.

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## Staff Resources

KDOW maintains existing staff to conduct BFE determinations, floodplain permitting, limited modeling, and administration of the NFIP program. KDOW staff has basic GIS capabilities and is supported by GIS personnel from the Governor's office of Technology (GOT). Although there are personnel currently on staff for website development, additional support is available through the EPPC.

Existing Staff Resources (NFIP-Related)		
Personnel	Role	FTE
Manager	Program oversight, executive support, performance management, resource allocation, contracts management	0.2
Floodplain Engineers	Data and resource management, limited QA/QC, technical engineering activities	0.2
NFIP Coordination	Scoping, study production, appeals process, compliance issues, flood hazard outreach activities, stakeholder engagement	2.0
Administrative	Support to other personnel, customer service, legal, grant and CTP agreement preparation	0.2

The proposed mapping activities and the establishment of a long-term floodplain management program at the state level will ultimately increase the amount of support personnel and resources necessary for conducting the proposed activities within this Business Plan. For further details on personnel and expense requirements, see Section IV – Project Management Plan.

## Legislative Authority

The Commonwealth of Kentucky has taken several steps to reduce the hazard of flooding. Chapter 151 of the Kentucky Revised Statutes (approved in 1966) is the state statute that addresses the development of floodplain areas. The most pertinent sections of KRS 151 are: (1) KRS 151.250, which establishes the requirements for obtaining a floodplain development permit; (2) KRS 151.125, which establishes the authority and powers of the Secretary of the Natural Resources and Environmental Protection Cabinet (now the Environmental Public Protection Cabinet) to administer KRS 151; and (3) KRS 151.320, which requires the judge/executive of each county or the mayor or chief executive officer of each city to concurrently enforce with the Cabinet, within their respective counties and cities, the provisions of KRS 151.250 or 151.280 and the rules and regulations issued there under.

Based on KRS 151, the Division of Water within the KEPPC has been designated as the state coordinating agency for the NFIP. As the coordinating agency, the Division of Water assists local governments and state agencies in answering all questions concerning the program.

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Under this authority, it is KDOW's responsibility to oversee all aspects of the state's floodplain management program, including the NFIP program and the development, maintenance, and administration of the state's flood hazard data. As the primary state agency, FEMA funding will position KDOW to upgrade and modernize the entire state mapping products, making maintenance and future updates easier for state staff. By funding the update of Kentucky's floodplain maps and allowing the state to build the in-house capabilities for administering the program, FEMA will enable the state to assume responsibility for the devolved floodplain mapping programs.

## Organizational Support

In the past, organizational support for Kentucky's floodplain management program has been limited. However, with a change in Kentucky's administration and a renewed commitment to natural resource management, the Commissioner for Kentucky EPPC has stated "Kentucky will make the necessary resources available to support this much needed program for the Commonwealth."

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*"Kentucky will make the necessary resources available to support this much needed program for the Commonwealth."*

## IV. Project Management Plan

KDOW has developed the following Project Management Plan that outlines the successful implementation of the Map Modernization program for all 120 counties by 2008. Based on the projected amount of FEMA funding, KDOW identified the number of counties to be mapped annually, prioritized the counties, selected the type of study projects, and determined the level of funding necessary to provide completed DFIRM mapping in a GIS format available through the Web.

Key elements of KDOW's Map Modernization Project Management Plan include:

- KDOW is primary contact and coordinator as state CTP;
- Mapping activities are managed at the state level;
- Effective partnerships are encouraged and created;
- New approximate studies are created statewide;
- Partner leverage is maximized;
- Project scheduling fulfills current FEMA metrics;
- KDOW in-house capabilities and capacities are extended; and
- Local community access and knowledge of floodplain issues is enhanced.

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*New approximate studies are created statewide.*

## CTP Partnerships

As the state CTP, KDOW will serve in an oversight capacity to ensure that all Map Modernization projects follow state and FEMA guidelines. Additionally, KDOW will be responsible for tracking compliance with budget and schedule requirements to keep the statewide Map Modernization on track. By building these initial oversight capabilities, KDOW will lay the foundation for managing future mapping needs in the upcoming years.

In some cases, such as MSD, KDOW plans to utilize the existing local study resources and provide funding directly to the CTP, with the understanding that the CTP will be responsible for fulfilling their own local business plan and re-mapping initiatives. The delegation of responsibilities to CTPs like MSD will allow those CTPs to develop specific

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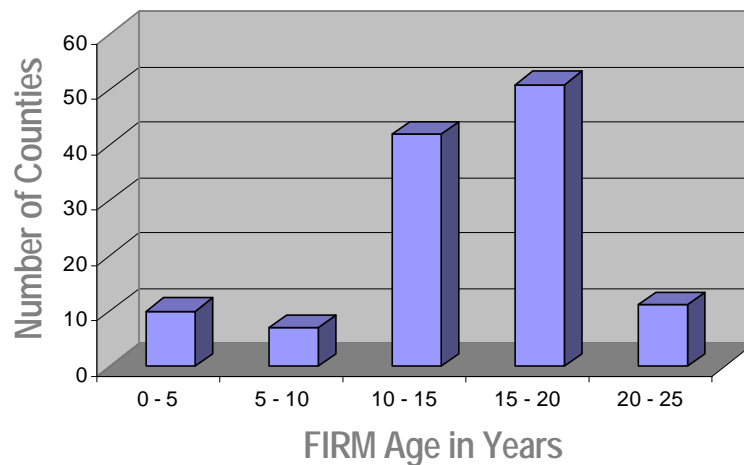
floodplain management tools (for future statewide use) while KDOW continues to focus on the administrative aspect of modernizing flood data in the remainder of the state.

## Map Production

Kentucky has over 4 million residents living in 120 counties. However, roughly 50% of the population is concentrated in only 15 counties. The production schedule for these counties has been weighted to allow high population counties to be produced early in the program, while the remaining counties will be processed according to their location within the major watersheds. This approach exceeds FEMA's metrics and provides a cost effective, logical basis for production.

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As can be seen by the graphic above, many of Kentucky's FIRMs include flood hazards that are approaching 15 to 20 years old. Many of these maps include Zone A delineations that would require considerable effort to convert and are of limited use by today's standards. Therefore, KDOW is proposing to replace these older studies with new approximate studies throughout the state. This approach will allow for updated flood hazards to be prepared throughout the state in an extremely cost-effective manner by enabling the state to perform countywide studies within major watersheds, instead of scattering resources in a one-county-at-a-time approach.

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*This approach exceeds FEMA's metrics and provides a cost effective, logical basis for production.*

A natural benefit to the state and the local communities will include new H&H models for permitting and other floodplain management initiatives. This watershed approach to map production compliments other KDOW programs, which are also managed and implemented at the watershed level. An illustration of the DFIRM production schedule can be found in Appendix A.

## Mapping Project Costs

KDOW used FEMA's "Blue Book" document to determine the production costs for each county. Currently, insufficient data exists with respect to the actual quantity of study mileage required to complete the program. Consequently, KDOW used the panel method of cost estimation. To prepare a more reliable estimation, KDOW looked at each county with respect to existing panel scale, the type of flood hazards (floodway, zone AE, zone A) and the extent of urbanization. An optimized configuration was developed using a combination of 500, 1000 and 2000 scale panels whereby the number of final DFIRM panels is kept to a minimum while FEMA DFIRM Guidelines and Specifications procedures for panel layout are followed. Using this configuration, nearly 2,300 map

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*KDOW used the panel method of cost estimation. To prepare a more reliable estimation, KDOW looked at each county with respect to existing panel scale, the type of flood hazards (floodway, zone AE, zone A) and the extent of urbanization.*

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panels would be required to complete the state DFIRM inventory. In addition to panel quantities, KDOW has performed informational reconnaissance to determine the need for detailed and/or limited detailed studies in the more populated counties. This information has also been quantified and was used to aid in the determination of the anticipated funding requirements per year.

## Timeline/Funding

Based on KDOW's assessment of statewide mapping needs, optimized panel configuration, and addressing high population areas first, a 5-year schedule was developed to meet FEMA objectives of completing statewide remapping by 2009. The following table provides an estimate of the total annual mapping project funding necessary for addressing the remapping requirements of Kentucky's 120 counties within the allotted timeframe.

**Mapping Project Funding (Total Program)**

Fiscal Year	Estimated Funding
2004	\$2,796,800
2005	\$2,806,200
2006	\$2,793,000
2007	\$2,802,000
2008	\$2,802,000
<b>Total</b>	<b>\$14,000,000</b>

KDOW has developed an initial five-year schedule for the Map Modernization of Kentucky's 120 counties. This schedule addresses high population areas first, and plans to complete statewide remapping by 2009, contingent upon future funding.

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*Nearly 2,300 map panels would be required to complete the state DFIRM inventory.*

During 2003, FEMA and KDOW initiated projects along the Ohio River, and in the CTP counties of Jefferson and Fayette. These projects (9 total) were considered "quick wins" due to the previous USACE Ohio River modeling and the extensive experience in Kentucky's two most populated communities. During this time, KDOW began building their role in the coordination and oversight of the state's Map Modernization efforts.

The following tables illustrate KDOW's future study schedule, deliverables, goals, and involvement on a year-to-year basis that will be completed with ongoing FEMA funding.



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## Year 1 (FY04) Funding Plan

County	Estimated FY04 Funding	Funding Allocated To	DFIRM Completion Date	KDOW Activities
Harlan	\$234,000	FEMA IDIQ	2005	KDOW will serve as a coordinating CTP and will assist in scoping efforts, work planning, etc.
Bell	\$138,000			
Whitley	\$162,000			
Perry	\$120,000			
Knox	\$132,000			
Laurel	\$102,000			
Jefferson	\$500,000	CTP		
Daviess	\$486,000			
Warren	\$366,000			
Boone	\$246,000			
Hardin	\$310,800			

### FY04 Funding Priorities:

- Federal appropriation earmarks: Harlan, Bell, Whitley, Perry, Knox and Laurel – Will apply newly-updated detailed study information from the USACE Nashville District;
- Jefferson County (MSD): Final year of proposed funding to complete extensive remapping effort – Proposed **FEMA Model CTP Community** (See MSD's Map Modernization Business Plan for details);
- Daviess County (Owensboro): Potential new CTP – Owensboro has combined detailed and limited detailed study needs with potential for strong local match;
- Warren County (Bowling Green): Potential new CTP – Bowling Green has combined detailed and limited detailed study needs with potential for strong local match;
- Boone County (Northern Kentucky): Existing CTP – Northern Kentucky Area Planning Commission (NKAPC) has combined detailed and limited detailed study needs with potential for strong local match; and
- Hardin County (Elizabethtown/Radcliff) – Potential new CTP. Expected funding needs over two years.

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## Year 2 (FY05) Funding Plan

County	Estimated FY05 Funding	Funding Allocated To	DFIRM Completion Date	KDOW Activities
Hardin	\$133,200	KDOW	2005	KDOW will serve as a coordinating CTP and will manage the scoping efforts, contract administration, project management, etc.
Pike	\$612,000			
Kenton	\$528,000			
Christian	\$474,000			
Franklin	\$264,000			
Hopkins	\$258,000			
Oldham	\$204,000			
Fayette	\$150,000			
Carroll	\$84,000			
Trimble	\$66,000			
Gallatin	\$33,000		2006	

### FY05 Funding Priorities:

- Remaining major metropolitan areas throughout Kentucky; and
- Ohio River counties.

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## Year 3 (FY06) Funding Plan

County	Estimated FY06 Funding	Funding Allocated To	DFIRM Completion Date	KDOW Activities
Gallatin	\$ 33,000	KDOW	2006	KDOW will serve as a coordinating CTP and will manage the scoping efforts, contract administration, project management, etc.
Meade	\$ 96,000			
Floyd	\$ 234,000			
Lawrence	\$ 192,000			
Johnson	\$ 186,000			
Martin	\$ 180,000			
Henderson	\$ 138,000			
Breckinridge	\$ 102,000			
Hancock	\$ 102,000			
Union	\$ 90,000			
Crittenden	\$ 78,000			
Letcher	\$ 108,000			
Leslie	\$ 96,000			
Clay	\$ 90,000			
Jackson	\$ 66,000			
Rockcastle	\$ 66,000			
Lee	\$ 66,000			
Owsley	\$ 48,000			
Pulaski	\$ 174,000			
Wolfe	\$ 48,000			
McCreary	\$ 96,000			
Morgan	\$ 84,000			
Wayne	\$ 102,000			
Spencer	\$ 48,000		2007	
Anderson	\$ 54,000			
Shelby	\$ 60,000			
Larue	\$ 78,000			
Mercer	\$ 78,000			

### FY06 Funding Priorities:

- Additional Ohio River counties;
- Upper Cumberland watershed;
- Upper Licking watershed;
- Upper Kentucky watershed;
- Lower Big Sandy watershed; and
- Expanding populations around Louisville and Lexington.

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## Year 4 (FY07) Funding Plan

County	Estimated FY07 Funding	Funding Allocated To	DFIRM Completion Date	KDOW Activities
Boyle	\$ 66,000	KDOW	2007	KDOW will serve as a coordinating CTP and will manage the scoping efforts, contract administration, project management, etc.
Washington	\$ 54,000			
McCracken	\$ 312,000			
Graves	\$ 144,000			
Marshall	\$ 126,000			
Livingston	\$ 114,000			
Fulton	\$ 90,000			
Hickman	\$ 78,000			
Calloway	\$ 72,000			
Ballard	\$ 60,000			
Carlisle	\$ 60,000			
Nelson	\$ 204,000			
Casey	\$ 138,000			
Marion	\$ 78,000			
Lincoln	\$ 66,000			
Taylor	\$ 66,000			
Knott	\$ 60,000			
Lyon	\$ 48,000			
Simpson	\$ 48,000			
Menifee	\$ 54,000			
Caldwell	\$ 66,000			
Garrard	\$ 66,000			
Powell	\$ 66,000			
Todd	\$ 72,000			
Estill	\$ 96,000			
Breathitt	\$ 108,000			
Clark	\$ 120,000			
Madison	\$ 120,000			
Logan	\$ 150,000			

### FY07 Funding Priorities:

- Remaining Ohio River counties;
- Remaining Salt River watershed;
- Lower Tennessee River watershed;
- Upper Green River watershed; and
- Lower Cumberland River watershed.

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## Year 5 (FY08) Funding Plan

County	Estimated FY08 Funding	Funding Allocated To	DFIRM Completion Date	KDOW Activities
Jessamine	\$ 90,000	KDOW	2008	KDOW will serve as a coordinating CTP and will manage the scoping efforts, contract administration, project management, etc.
Montgomery	\$ 54,000			
Trigg	\$ 90,000			
Woodford	\$ 54,000			
Adair	\$ 90,000		2009	
Allen	\$ 72,000			
Barren	\$ 78,000			
Bath	\$ 72,000			
Bourbon	\$ 114,000			
Butler	\$ 90,000			
Carter	\$ 180,000			
Clinton	\$ 36,000			
Cumberland	\$ 54,000			
Edmonson	\$ 66,000			
Elliott	\$ 54,000			
Fleming	\$ 66,000			
Grant	\$ 66,000			
Grayson	\$ 102,000			
Green	\$ 60,000			
Harrison	\$ 132,000			
Hart	\$ 72,000			
Henry	\$ 66,000			
McLean	\$ 54,000			
Metcalfe	\$ 60,000			
Monroe	\$ 54,000			
Muhlenberg	\$ 126,000			
Nicholas	\$ 60,000			
Ohio	\$ 144,000			
Owen	\$ 114,000			
Robertson	\$ 36,000			
Rowan	\$ 90,000			
Russell	\$ 90,000			
Scott	\$ 126,000			
Webster	\$ 90,000			

### FY08 Funding Priorities:

- Remaining Green River watershed;
- Remaining Kentucky River watershed;
- Remaining Upper Cumberland River watershed; and
- Remaining Licking River watershed.



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## Mapping Cost Issues

A unit cost estimate of \$6,000 per panel was used to determine the costs associated with preparing flood hazard updates, basemap acquisition and DFIRM production. This unit cost does not include preliminary and post-preliminary processing or printing and distribution costs which are estimated at approximately \$750 per panel (\$1.2 million statewide). KDOW is considering alternatives to avoid or reduce these costs by using state and/or other partner resources to assist in the preliminary and post-preliminary processing. It is unknown at this time how the print-on-demand pilot program conducted by Louisville MSD will impact the state's ability to offset the DFIRM printing and distribution costs.

## Leverage / Match

As previously noted in the Business Plan, Kentucky has a wealth of digital basemap information ready to implement DFIRMs statewide. KDOW has determined that a substantial amount of engineering study information exists at federal and local levels as well to support rapid development of flood hazard updates. Although the extent and quality of the information is unclear at this time, KDOW anticipates the data becoming available during subsequent leverage determination tasks. Consistent with KDOW's partnering approach, preliminary scoping meetings with many communities have shown an eagerness to share data and potential local dollars as matching funds towards the optimistic vision of **better maps** – not just digital maps. These scoping efforts have yielded the following types of information which KDOW intends to leverage for the Map Modernization program:

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*Preliminary scoping meetings with many communities have shown an eagerness to share data and potential local dollars as matching funds towards the optimistic vision of **better maps** – not just digital maps.*

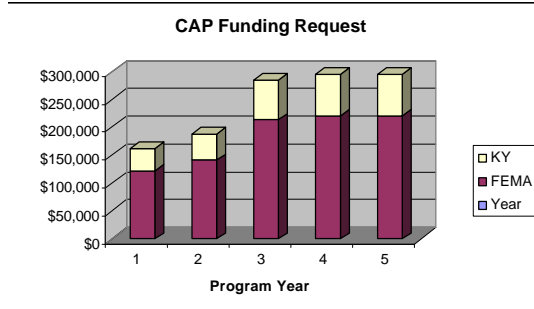
- Consistent seamless GIS basemap;
- Local GIS repositories with high resolution imagery and topography in many of Kentucky's high population areas;
- USACE modeling along the Ohio River (664 miles);
- H&H modeling and hydraulic structure information on state-maintained roads;
- Detailed study data, channel and topographic survey data in some communities;
- Local cash contributions and/or the willingness to perform channel surveys to help offset costs associated with increased quality of flood hazard updates; and
- IT resources necessary to maintain and disseminate DFIRMs.

## Resources / Staffing

KDOW's plan relies largely on FEMA Map Modernization funding for completion of the outlined statewide mapping projects. To the maximum extent possible, KDOW will capitalize upon existing community leverage, building partnerships with Kentucky's other CTPs, and integrating existing data and resources from other agencies.

- **Existing State Digital Resources** – The state has extensive GIS data management and distribution capabilities. This existing data will allow the development of DFIRMs using existing statewide basemapping data. Additionally, the state already has the necessary hardware and software to support the maintenance and update of the DFIRM products for their future role in ongoing floodplain management.

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*KDOW CAP-MAP Funding Request*

- **Local Community Leverage** – Throughout the development of the Business Plan and Kentucky's Map Modernization strategy, KDOW staff and representatives met with high priority counties that were being considered for funding in 2004 to assess the amount of local leverage and existing study data. This information was used to more accurately assess the cost of remapping for each county and to maximize the value of FEMA funding. The value of this leverage will be determined during KDOW's budgeting and cost estimation planning.
- **CTP Partnerships** – KDOW recognizes the role and resources that the state's CTPs can play in aiding in the advancement of the statewide program. With existing resources and capabilities, these partnerships will position KDOW to build upon existing mapping technology assets in the state and utilize them for the benefits of additional partners. Two primary partners are the Louisville and Jefferson County MSD and the NKAPC. The NKAPC encompasses Kenton County, Boone County and Campbell County and is the lead agency in the Northern Kentucky area that manages extensive GIS databases to aid in land use planning efforts and hazard management.
- **Integration of Existing Studies** – KDOW will also be capitalizing upon H&H modeling and floodplain studies in counties where mapping has not been updated to reflect existing studies, such as those conducted by the Corps of Engineers or the Kentucky Transportation Cabinet. The Corps of Engineers floodplain studies have been performed along the Ohio River, while the Transportation Cabinet has analyses of upstream and downstream flood hazards for bridges along state routes and hydraulic structure data along major Kentucky waterways.
- **Other Partners: The University of Louisville** – The University of Louisville has played an important role in the preparation of this Map Modernization Business Plan. The University assisted during the CTP leverage discovery and scoping process. Similarly, the University has also been a helpful partner to the state in the development of its All Hazard Mitigation Plans. KDOW considers the University of Louisville an important part of the implementation of this Business Plan.

*KDOW plans to spend the majority of the funding on building internal capabilities; however outsourcing may be utilized as necessary. As in the past, Kentucky will provide the required 25% matching funds – either through hard match or in-kind services*

KDOW also plans to build internal capacity to enable effective Map Modernization program management. For the past few years, KDOW has utilized FEMA's Community Assistance Program (CAP) funding to help offset the costs for NFIP-related administration activities. KDOW intends to greatly expand the use of this program immediately.

KDOW plans to spend the majority of the funding on building internal capabilities; however outsourcing may be utilized as necessary. As in the past, Kentucky will provide the required 25% matching funds – either through hard match or in-kind services. The anticipated CAP MAP Phase II resource needs are listed in the following tables. As previously noted, coordination will be performed in accordance with 44 Code of Federal Regulations, Part 66 Consultation with Local Officials.

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	Annual Salary	YEAR 1			YEAR 2		
		Starting FTE	FY04 FTE	FY04 Costs	Starting FTE	FY05 FTE	FY05 Costs
<b>Personnel</b>							
Manager	\$ 50,000	0.2	0.1	\$ 5,000	0.1		\$ 5,000
Floodplain Engineer	\$ 40,900	0.2	1.2	\$ 49,080	1.2	0.5	\$ 69,530
NFIP Coordination	\$ 37,000	2.0	0.0	\$ 74,000	2.0	0.5	\$ 92,500
Administrative	\$ 30,000	0.2	0.3	\$ 9,000	0.3		\$ 9,000
<b>Expenses</b>							
Travel				\$ 3,000			\$ 3,000
Hardware/Software				\$ 15,000			\$ 5,000
Training (GIS, H&H Modeling)				\$ 3,000			\$ 1,000
Other				\$ 2,500			\$ 1,500
Indirect				\$ 1,500			\$ 1,500
Subtotals:		2.6	1.6	\$ 162,080	3.6	1.0	\$ 188,030
KY Match (25%):				\$ 40,520			\$ 47,008
FEMA CAP Funding:				\$ 121,560			\$ 141,023

	Annual Salary	YEAR 3			YEAR 4		
		Starting FTE	FY06 FTE	FY06 Costs	Starting FTE	FY07 FTE	FY07 Costs
<b>Personnel</b>							
Manager	\$ 50,000	0.1	0.2	\$ 15,000	0.3		\$ 15,000
Floodplain Engineer	\$ 40,900	1.7	1.1	\$ 114,520	2.8		\$ 114,520
NFIP Coordination	\$ 37,000	2.5	0.5	\$ 111,000	3.0	0.5	\$ 129,500
Administrative	\$ 30,000	0.3	0.5	\$ 24,000	0.8		\$ 24,000
<b>Expenses</b>							
Travel				\$ 3,000			\$ 3,000
Hardware/Software				\$ 8,000			\$ 5,000
Training (GIS, H&H Modeling)				\$ 5,000			\$ 1,000
Other				\$ 2,500			\$ 1,500
Indirect				\$ 1,500			\$ 1,500
Subtotals:		4.6	2.3	\$ 284,520	6.9	0.5	\$ 295,020
KY Match (25%):				\$ 71,130			\$ 73,755
FEMA CAP Funding:				\$ 213,390			\$ 221,265

	Annual Salary	YEAR 5			PROGRAM TOTAL	
		Starting FTE	FY08 FTE	FY08 Costs	Program FTE	Program Costs
<b>Personnel</b>						
Manager	\$ 50,000	0.3		\$ 15,000	0.5	\$ 55,000
Floodplain Engineer	\$ 40,900	2.8		\$ 114,520	3.0	\$ 462,170
NFIP Coordination	\$ 37,000	3.5		\$ 129,500	3.5	\$ 536,500
Administrative	\$ 30,000	0.8		\$ 24,000	1.0	\$ 90,000
<b>Expenses</b>						
Travel				\$ 3,000		\$ 15,000
Hardware/Software				\$ 5,000		\$ 38,000
Training (GIS, H&H Modeling)				\$ 1,000		\$ 11,000
Other				\$ 1,500		\$ 9,500
Indirect				\$ 1,500		\$ 7,500
Subtotals:		7.4	0.0	\$ 295,020	8.0	\$ 1,224,670
KY Match (25%):				\$ 73,755		\$ 306,168
FEMA CAP Funding:				\$ 221,265		\$ 918,503

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## Deliverables

With sufficient FEMA support, KDOW has committed to the completion of this five-year program. The table below illustrates the number of counties, estimated cost and the percent of the state's population that will be served by the new mapping per year.

Fiscal Year	Counties Completed	Estimated Cost (in millions)	Percent Population Complete
FY2004	9	N/A	8%
FY2005	20	\$2.796	57%
FY2006	20	\$2.806	67%
FY2007	18	\$2.805	76%
FY2008	20	\$2.796	87%
FY2009	33	\$2.796	100%
<b>Program Total</b>	120	\$14.00	100%

In addition to the mapping projects, KDOW will produce and implement the statewide HIP that is populated, updated, and maintained with the state's latest flood hazard data. The site will allow communities to view and upload local hazard information to ensure accuracy and involvement at the local level. KDOW anticipates the initial release of the portal in FY2006, once the technologies are developed and tested by the local CTP partner, MSD, as part of their own Map Modernization Business Plan. In subsequent years, KDOW will continue increasing the functionality of the portal and population of digital flood hazard data.

## Reporting

KDOW will serve as the state clearinghouse for the development and maintenance of flood hazard information. As Map Modernization activities are completed, the products will be uploaded into the state's HIP which will then serve as a tool for inventory, assessment, management and hazard information queries.

Depending on the type of user, HIP will be available for input and output associated with specified user guidelines. The development/engineering community will use the Model Management as a check-out/check-in system that will keep the H&H modeling continuously updated. The checking out of models from the site will provide developers the most current information for projects and ensure that any updates to the models are submitted through the check-in process. This ensures that the most precise and current H&H models are always available and that DFIRMs are being subsequently updated.

The state HIP will be developed to interface with the National Service Provider's Mapping Information Portal (MIP) and updates at the state level will be automatically made at the national MIP. This near real-time map maintenance ensures accuracy and consistency between the devolved state program and the national information management system. By capitalizing upon online information dissemination, users are provided immediate access to the most recent flood hazard information.

## Quality Assurance

KDOW's ultimate goal is to complete all quality assurance review of H&H modeling and mapping efforts, with limited quality assurance oversight from FEMA. Although KDOW

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does not currently possess the necessary capacity to conduct this program management activity, KDOW's Map Modernization Business Plan builds this capacity for complete transition to the state by FY2006-07.

## V. Performance

### Performance Measures

Performance measures for KDOW's Business Plan are based on the successful completion of the mapping projects within the allotted cost and schedule. With tight cost and schedule performance measures, and a goal of meeting FEMA's metrics, KDOW and their study contractors will be motivated to conduct projects and implement supporting administrative programs in a timely manner.

To ensure continued success of remapping projects, study contractors will be assessed on previous mapping contracts, based on their progress reporting and fulfillment of their schedule and cost performance measures. KDOW plans to base future contract awards on the contractor's historical performance to further ensure contractor accountability.

### Progress Tracking

KDOW will require study contractors to submit monthly and/or quarterly progress reports to ensure that the remapping remains on schedule and on budget. KDOW staff will be increasingly responsible for review and enforcement of performance measures over the span of the remapping projects. KDOW will ensure that FEMA's web-based tracking system is updated in accordance with their study contractor progress reports.

## VI. Alternatives

The performance metrics discussed in this Business Plan can only be met if the required funding is received within the appropriate timeframe. Due to annual funding limitations, KDOW has structured the production schedule at or near \$2.8 million per year. If this funding level is not achieved, or if funding is delayed within a given year, production schedule will be negatively impacted. The following table illustrates the funds necessary to complete this Business Plan.

Fiscal Year	Map Modernization (FEMA)	CAP MAP Phase II (FEMA)	CAP MAP Phase II (Kentucky)	Total
FY2004	\$2,796,800	\$121,560	\$40,520	\$2,958,880
FY2005	\$2,806,200	\$141,023	\$47,008	\$2,994,230
FY2006	\$2,793,000	\$213,390	\$71,130	\$3,077,520
FY2007	\$2,802,000	\$221,265	\$73,755	\$3,097,020
FY2008	\$2,802,000	\$221,265	\$73,755	\$3,097,020
<b>Program Total</b>	<b>\$14,000,00</b>	<b>\$918,503</b>	<b>\$306,168</b>	<b>\$15,224,670</b>

If total Map Modernization program funding is limited or otherwise unavailable, KDOW may choose to re-evaluate individual county priorities to exclude those counties who do not currently participate in the NFIP and/or those counties that have no effective FIRM. Similarly, if CAP MAP funding is limited, KDOW may chose to forego some of the activities listed in this Business Plan.



## VII. Summary

KDOW has developed a logical, comprehensive, and reasonable approach for completing remapping of Kentucky's 120 counties within the next 5-years while **exceeding FEMA's metrics** and building the state's capacity to assume full responsibility for future program oversight and administration. This approach will not only provide Kentucky's citizens with optimal flood hazard data, but aid in FEMA's goal of devolving floodplain administration activities. Additionally, KDOW goals are achieved including;

- KDOW is primary contact and coordinator as state CTP;
- Mapping activities are managed at the state level;
- Effective partnerships are encouraged and created;
- New approximate studies are created statewide;
- Partner leverage is maximized;
- Project scheduling fulfills current FEMA metrics;
- KDOW in-house capabilities and capacities are extended; and
- Local community access and knowledge of floodplain issues is enhanced.

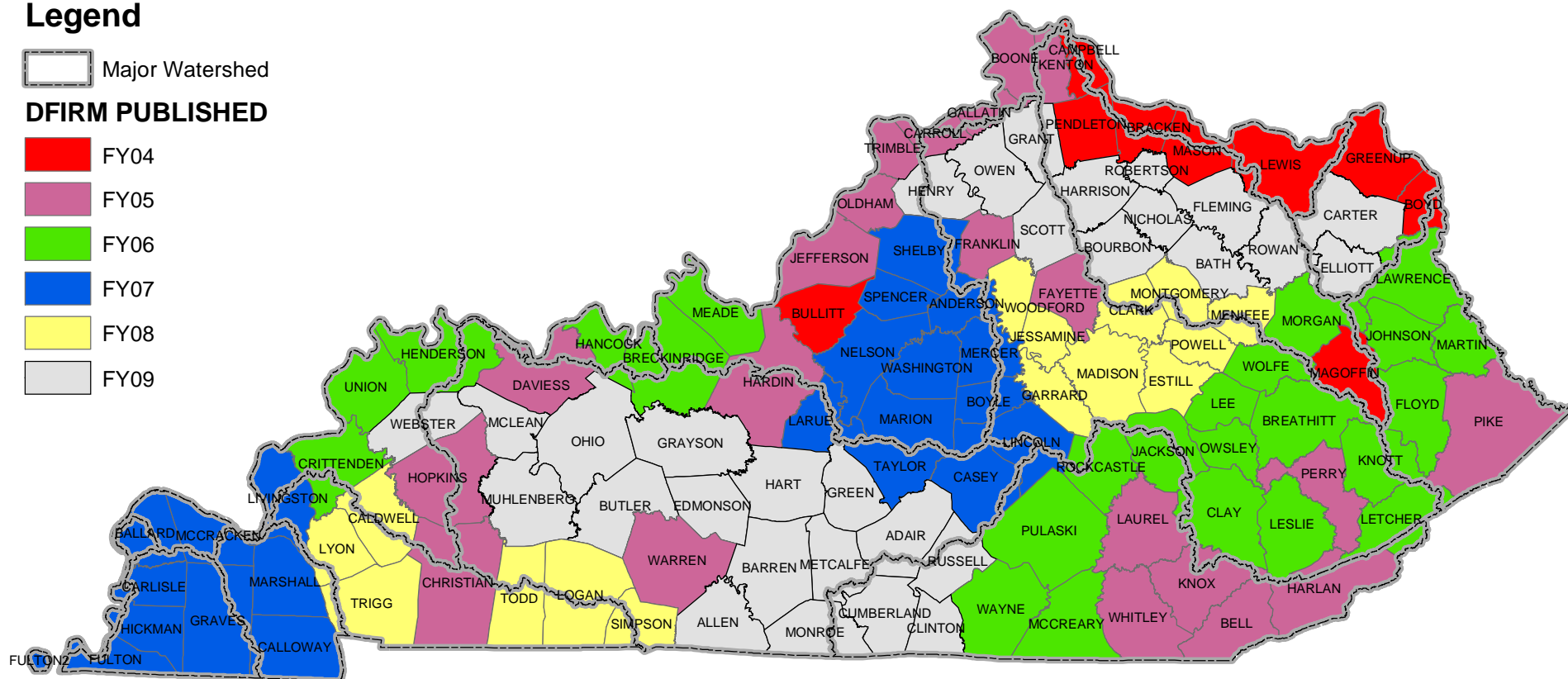
With an initial infusion of FEMA resources, and roughly \$3 million over the next 5 years, KDOW will be enabled to develop statewide partnerships and updated floodplain information to foster the state's vision of an in-house oversight program.

## **Appendix A:**

### **Kentucky Map Modernization Project Schedule**

# Kentucky Map Modernization Production Schedule

## Legend

**DFIRM PUBLISHED**

Kentucky Natural Resources and  
Environmental Protection Cabinet  
Division of Water



FEMA

